

CATTLE CARETAKERS

Environmental and animal science curriculum unit









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INTRODUCTION

Beef cattle farmers are excellent stewards of the land and our earth's natural resources. They also work hard to provide excellent care for the animals they produce. In this series of lessons, we will look closer at the keys to good stewardship, the secrets to successful animal husbandry, and ways beef cattle farmers contribute to a healthy environment.

KEY TERMS

STEWARDSHIP

Stewardship is the careful and responsible management of our environment and natural resources.

ANIMAL HUSBANDRY

Animal husbandry refers to the care and management of livestock animals.











Objective:

Students will be able to define animal husbandry and will be able to identify basic needs for beef cattle including: proper nutrition, access to fresh water, veterinary care, and protection.

Background Information:

This lesson focuses on caring for beef cattle. Students will explore the ways to care for the Earth and its animals by using the farmer as a model.

Raising animals for the products they provide can be traced to prehistoric times. Animal husbandry is the science and art of producing livestock. It includes the breeding, feeding, management, care and marketing of farm animals.

Livestock producers constantly evaluate and often implement new technologies and management programs in order to provide better care for their animals and to respond to the changing demands of the marketplace. Students will learn that farmers and ranchers care for animals by:

- A nutritious and balanced diet
- Adequate quantity and quality of water
- Protection from nature's elements
- Fences to control grazing and protect livestock from straying
- Preventative health care and veterinary service
- Protection from predators

It should also be noted that wildlife also benefit from the food, water, and space that farmers provide.



Introduction: In this activity, students will create a trail mix to demonstrate the role an animal nutritionist plays in formulating TMR (Total Mixed Rations) to suit cattle's dietary needs.

Time: 45 minutes

Materials:

- Scale (1 per group of 4-5 students)
- Plastic cups (5 per group)
- Quart Size Baggies (1 per student)
- Mixing Bowls
- Mixing Spoons
- Pretzel Sticks



- Corn Pops Cereal
- M&M's
- Yogurt Coated Raisins
- Chocolate Chips

Procedure: Begin by polling the class and creating a list on the board of all the things they think cattle need to be healthy. Answers will vary, but should include basics like food, water, and medicine.

Ask the class to think more about what cattle might eat. Answers will vary. Then ask the students if they have ever eaten trail mix? What types of food are typically found in trail mix? Why do you think there is such a variety? Explain to the students that trail mix generally combines several different foods that provide high amounts of energy.

Explain to the class that today you will be creating a TMR for a herd of beef cattle. TMR stands for Total Mixed Ration and is a way to calculate percentages of essential nutrients in a cow's diet. A farmer will combine different foods to formulate the TMR, much like how we combine ingredients for trail mix. Farmers or an animal nutrition expert carefully measures by weight the appropriate amount of each component for the cattle and then can blend them in a larger feed mixer (similar to mixing ingredients in a bowl).

Divide the students into groups of 4 or 5 students and distribute supplies:

- Pretzel Sticks These represent forages like silage, stored hay, or grass. These provide high energy through protein, carotene, and calcium and is an important staple in a cow's diet.
- Corn Pops Cereal Represents corn, another high energy feed for cattle.
- M&Ms These represent protein needed for development and growth processes needed in the body.
- Yogurt Coated Raisins Represent fiber in the diet that may come from feed like peanut hulls or cottonseed
- Chocolate Chips Represent sugar supplement in the diet. Sometimes carbohydrate sources like Molasses are added to the diet, but are not always necessary.

Explain Further: Today, you will be formulating a 1 pound TMR to share with your group. Distribute the handout. Ask students to calculate the amount needed of each feed to formulate 1 pound of feed.

Trail Mix Recipe for 1 lb. (for each group) 55% forage = .55 lb. Pretzels 20% corn = .20 lb. Corn Pops 15% protein = .15 lb. M&Ms 5% cotton seed = .05 lb. Yogurt Raisins 5% sugar source = .05 lb Chocolate Chips



The groups should then weigh out each item to the appropriate proportion. Remember to subtract or "zero" the scale for the weight of the bowl. Mix ingredients together. Make sure that the entire ration is 1 pound. Each group's ration should look very similar if they were measured correctly. Divide into baggies for the group to enjoy.

While students are enjoying their snack, have them calculate what the weight of each item would be if we asked for 1.5 pounds of feed.

Explain that the TMR can be customized based on the needs of the cattle. For example, during pregnancy and lactation, brood cows need higher levels of energy to support a growing calf and produce milk for their calves after they are born.

Reflection Questions:

- What are some different scenarios where a farmer might adjust a TMR for his cattle?
- How might a TMR for a weaned feeder calf be different from a brood cow?
- Is TMR similar to the MyPlate model of a balanced meal? How?

Source: Adapted from University of Tennessee Extension



TMR Trail Mix

Using the chart below, take inventory of your trail mix ingredients. With your teacher's help, learn more about what each ingredient represents in the diet. The first ingredient is completed as an example.

Ingredient	Purpose/Represents
Pretzel Sticks	represent forages like silage, stored hay, or grass. These provide high energy through protein, carotene, and calcium

Trail Mix Recipe for 1 lb.

% of TMR	# of lbs	Ingredient
55% forage		
20% corn		
15% protein		
5% fiber		
5% carb/sugar source		



Trail Mix Recipe for 1.5 lb

% of TMR	# of lbs	Ingredient
55% forage		
20% corn		
15% protein		
5% fiber		
5% carb/sugar source		

Reflection Questions:

1. What are some different scenarios where a farmer might adjust a TMR for his cattle?

2. How might a TMR for a weaned feeder calf be different from a brood cow?

3. Is TMR similar to the MyPlate model of a balanced meal? How?





Introduction: In this activity, students create an informational bulletin board to discover how beef cattle go from a pasture to our plate.

Time: 90 minutes

Materials:

- Access to the internet
- Bulletin Board
- Paper Roll, Border, Lettering for Class or Hallway Bulletin Board
- 11x14 or 12x18 oversized paper
- Markers or other craft supplies

Procedure: Explain to the class that today they will be researching the beef industry to create an informational bulletin board about the life cycle of beef cattle. Explain that the life cycle takes place in several different sectors of the industry.

Divide the class into 6 groups (modify as needed). Assign each group a stage or component of the life cycle:

- Cow/Calf Farm
- Weaning
- Stocking and Backgrounders
- Livestock Auction Markets
- Feed Yards
- Packing Plant

Direct students to the Virginia Beef Council website where they can read more about each stage. Tell the students that their group is in charge of creating a poster for their stage of the cycle. Using credible resources, students should research their topic further. Assign criteria for the poster based on your class competencies. Topics may include, but are not limited to:

- Animal Health
- Animal Nutrition
- Protection/Safety of Animals
- Careers
- State and National Data
- Interesting Facts
- Tables, Graphics, Images

Include the students in the overall design and installation of the bulletin board.



Resources: https://www.vabeef.org/farm-to-fork

Reflection Questions:

- What was something interesting that you learned because of this activity?
- What part of the life cycle is most interesting to you? Why?
- Which of the careers mentioned in the posters sounded interesting to you? Why?

Extension Activities:

- Watch the Virginia Agriculture in the Classroom interview with ______ to learn more about how farmers utilize veterinarians to take care of their animals at various stages in their life cycle. Reflect and brainstorm how we as people are cared for by medical professionals at various stages in our lives.
- Have the class brainstorm and then vote on a catchy, engaging title for the bulletin board.
- Set up a Zoom or Google Meet with a local Cow/Calf farmer. Prepare interview questions and learn more about the industry, straight from the source.
- Create or submit a request for informational brochures. Create a pocket on the bulletin board and add brochures to give away for extra promotion.





Objective: Students will understand the important role that cattle farmers play in stewardship of our earth's natural resources.



Background Information:

Water, the most abundant of all chemical compounds, is a necessity for all living things. It is an essential to all living organisms and a major component of our environment. Water and ice cover about 75% of the Earth's surface and water vapor is an important part of the atmosphere.

Because of the water cycle, there is as much water on Earth today as there ever was or will ever be. The water you used for a shower this morning may be the same water a Native American used to irrigate crops hundreds of years ago.

While the amount of water on Earth remains constant, its availability and usability changes. The liquid state of water is most important to live, but the sun's heat causes water to evaporate and become water vapor.

When air becomes saturated with water vapor, condensation occurs. Warm air is capable of holding more water than cool air. Cooling of warm, moisture-laden air causes precipitation of water as rain, sleet, or snow.

Salt water found in oceans and seas accounts for 94% of all the water on Earth. It cannot be used for agriculture, drinking or by industry unless it is desalinated or until it evaporates.

Agriculture depends on water for crops and livestock. Some water used for feeding livestock or growing plants isn't available to humans and is converted into food for people and animals, while the remaining water used in agriculture is recycled through the groundwater system.

Water quality is a vitally important issue for everyone. Society has made great strides in addressing water pollution problems. Many factories, sewage plants and others treat contaminated water before discharging itt into sewers or streams.

Purity can also be affected as water moves through the water cycle. Water allowed to run off unfiltered can pick up chemicals, soil, manure, household chemicals and more. This pollution comes from cities, forests, mining operations, construction sites, suburban areas, and farms. If left unchecked, run off water may carry contaminants to nearby surface waters or groundwaters beneath the surface.



Because farmers and ranchers are concerned about water quality, they continually improve their practices. Farmers are developing better ways to test their soil so they don't over fertilize their crop fields. They are planting winter crops to help cover the soil, keep it in place, and prevent soil erosion. They are also planting trees along streamlines to serve as an underground buffer between the field and the water source.

Introduction: This lesson will demonstrate how best management practices can be used to maintain good water quality.

Time: 45 minutes

Materials:

- Paper Towel
- Scissors
- Funnel (purchased or homemade)
- Clean Sand
- Clear Glasses or Jars (small mouth works best with the funnel)
- Spoon
- Water
- Soil

Procedure:

- Draw and cut out a large circle from the paper towel.
- Fold it in half, then in half again.
- Open the folded circle a little to make a paper cone.
- Put the cone inside the funnel and set the funnel in one of the glasses or jars.
- Fill the cone with clean sand. Fill the other jar with water.
- Add ¹/₄ cup of soil to 2 cups of water and stir it. Slowly pour the muddy water into the funnel.
- Record observations as water seeps through the funnel.
- Discuss what happened to the soil and water mixture as it traveled through the filter.
- Does a phase filtering clean all particles from the water? Why or why not?

Extension Activities:

- Have students revise a filtration system which will cleanse the water. Try using different filters such as peat moss.
- Encourage students to develop a method to prevent soil and impurities from entering the water source at the creek and stream level.
- Assign students the task of writing a persuasive essay to use best management practices to keep streams and ponds free of soil runoff.
- Explore how non-agricultural groups can take action to improve water quality.





Background: A pasture is a wide, open grassy space used for livestock grazing. Pasture management begins with grass. We tend to take grass for granted because there seems to be so much of it. In fact, there is a lot of grass. It is one of our most important and available renewable resources. Grass plays a number of environmentally important roles. Grass covers the soil and holds it in place, slowing runoff of rain, preventing erosion, and reducing the potential for floods. Grass traps and filters sediments and nutrients from runoff, and helps water percolate through the soil and back into streams and groundwater.

Cattle are like pasture lawn mowers that can help care for grassland ecosystems. Imagine what your lawn would look like if you didn't mow it! At first glance when we see animals grazing, it seems like the animal wins all. However, there are more winners here than first meets the eye. The moment grass is shorn, it seeks to restore a balance between its roots and leaves. When the tops of the grass leaves are eaten by grazing livestock, the same amount of root is lost. When the roots die, the soil's population of bacteria, fungi, and earthworms gets to work breaking down the dying roots. This creates fertile organic matter that enriches the soil.

Rich soils in turn support more grass growth. Grasses regrow from the bottom up. Because their growing point is low to the ground, grasses can usually recover well after grazing. However, repeated, heavy grazing can kill grass. When a grass plant is grazed very low to the ground, a large portion of its roots die, and it has little leaf area left to make energy through photosynthesis. Because the plant can't generate much energy, it takes a long time for the roots to regrow, and the plant is very susceptible to drought. Proper management of grazing involves moving livestock to a new area before grasses are grazed too low and allowing grasses a period of rest to regrow leaves and roots before grazing them again. With proper management, grazing can be a tool for keeping pastures healthy.

In well-managed pastures, decaying roots are the biggest source of new organic matter, and grazing animals actually build new soil from the bottom up. In the absence of grazers, the soilbuilding process would be nowhere near as swift or productive. Grazing cattle aerate the soil with their hooves, scatter seeds, and trim wild grasses. Wildfires have a harder time taking hold on shorter, cropped grass than on longer vegetation. Properly grazed or "mowed" grass can help create healthy green grass!

Introduction: Students will grow "test plots" to compare overgrazed, grazed, and ungrazed pastures.

Time: Ongoing at 10-15 minute increments.

Materials:

- 3 Jiffy peat soil pellets or supplies for 3 knee-high stocking Chia pets
- Scissors



- Paper to label pots
- Marker
- Graph Paper

Procedure:

- Prepare for this lesson by having students plant a uniform amount of grass seeds in 3 Jiffy soil pots, or hosiery Chia Pets (Example: <u>https://u.osu.edu/cloverbudconnections/2021/05/24/growing-chia-pets/</u>).
- Label each pot 1, 2, and 3.
- Once the seeds germinate, keep the pots moist, and allow the grass to grow until it has reached 2–3 inches in height. Students will be applying two different grazing treatments and will leave some of the grass untreated.
- When the grass is 2–3 inches tall, ask the students to use scissors to cut the grass of pot #1 to 1 inch above the soil to simulate a cow grazing.
- Then, clip the grass of pot #2 down to the crown—where the blades meet the roots; this part of the blade is white in color. To simulate overgrazing, ask students to clip this quarter area to the crown every couple of days.
- The grass in pot #3 should remain unclipped.
- Observe the grass for a few weeks, and then make comparisons. Use graph paper to make bar graphs to display and compare growth. What are the results of the overgrazed, grazed, and ungrazed grasses? Ask students how their grazing experiment compares to mowing their grass.

Extension Activities:

 Research more about pasture management and conservation practices through Virginia Cooperative Extension's Graze 300 program. <u>https://ext.vt.edu/agriculture/graze-</u> <u>300.html</u>

Companion Resources:

Keys to Stewardship (My American Farm) - <u>http://www.myamericanfarm.org/games/keys-to-</u> stewardship

